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Cubic-foot Volume Tables for Southwestern Ponderosa Pine

by

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CUBIC-FOOT VOLUME TABLES FOR SOUTHWESTERN PONDEROSA PINE

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[1] Central headquarters maintained in cooperation with Colorado State University at Fort Collins.

CUBIC-FOOT VOLUME TABLES FOR SOUTHWESTERN PONDEROSA PINE

by

Edward M. Gaines and Geraldine Peterson

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Pulpwood markets now developing in the Southwest make it necessary to estimate volumes of material that can be used in this industry, including large quantities of wood in trees and parts of trees below saw-log size. Since there has been no need to estimate this class of material before, no applicable volume tables have been available.

Although pulpwood from ponderosa pine (Pinus ponderosa Laws.) is commonly measured and sold by the cord, basic data are inadequate for preparing volume tables on a cord basis. Variables other than tree diameter and height also affect cord volumes. One standard approach to cordwood estimation is to compute volumes in cubic feet and later convert to cords if desired.

EXPLANATION OF TABLES

The data for the tables were collected in 1932 on the Sitgreaves National Forest in Arizona. Two series of tables are presented here: volumes to a fixed top of 4.0 inches diameter inside bark, and volumes to a fixed top of 8.0 inches diameter inside bark. Pulpwood and other cordwood are commonly utilized to a 4-inch top diameter inside bark. The 8-inch-top tables can be used in making direct comparisons between board-foot and cubic-foot volumes of the same material, in separating volumes suitable for sawtimber from total volumes, or in estimating cordwood volumes of large trees in which 8 inches may be near the utilization limit.

Both series include separate tables for blackjacks (young, rapidly tapering ponderosa pine) and combined yellow pines-intermediates (older trees with less taper). These tree classes are commonly used and generally understood throughout the Southwest.

Both series include tables based on total tree height by 10-foot classes and on height to 8 inches d.i.b. by standard 16.3-foot log lengths. In addition the series to 4-inch-top volume includes tables based on height to 4 inches d.i.b. by 8-foot lengths. Height and d.b.h.o.b. values in the tables are for class midpoints; i.e., the 8-inch diameter class includes from 7.6 to 8.5 inches.

Tables based on total height or height to 4-inch d.i.b. will be most useful in new cruises designed specifically for cordwood volumes. Tables based on height to 8-inch d.i.b. can be used for computing cubic-foot volumes from standard sawtimber cruises. To convert volumes from tables 1a and 1b (total volumes to a 4-inch d.i.b. top) to merchantable volume where merchantable volume ends at the top of the last 4-foot bolt below the 4-inch d.i.b. point, simply subtract 0.2 cubic foot from the volume of each tree.

Three pairs of the tables (1a and 1b, 2a and 2b, 5a and 5b) were derived directly from tree measurements, using the general approach suggested by Bruce and Schumacher[2] (pp. 246-247) for the logarithmic expression of partial stem volume in cubic feet. The basic equation

$$(V - v) = (D - d)^a (H - h)^b C$$

was modified in some cases to obtain a better fit of the data.

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[2] Bruce, Donald, and Schumacher, Francis X. Forest mensuration. Ed. 3, 483 pp., illus. New York, Toronto, London. 1950.

It also developed that the equations gave illogical volumes for some small trees.[3] The tables were therefore checked by use of Smalian's formula

$$V = \frac{A + a}{2} L$$

and volumes of small diameters and short heights adjusted to logical values.

Tables 3a and 3b were prepared by adding the computed volumes for top segments 4.0 inches d.i.b. to 8.0 inches d.i.b. to the volumes of tables 5a and 5b. Tables 4a and 4b were prepared by subtracting computed volumes for top segments from volumes of tables 1a and 1b. Copies of the estimating equations, the statistics pertaining to them, and the adjustments made in the final tables may be obtained from the Rocky Mountain Forest and Range Experiment Station.

Aggregate differences and average deviations shown for each table are based on diameters outside bark.

CAUTIONS IN USE OF TABLES

Tables may lose accuracy when extended beyond the limits of basic data. These tables should be satisfactory if most trees tallied are within one height class of the basic data. If very many trees are taller or shorter, a sample of the exceptional trees should be measured and actual volumes compared with volumes from the table. Adjustments can then be made if needed.

The taper, as well as the height, of trees tends to vary from locality to locality. If taper in any locality is known to be unusually high or unusually low, the tables should be checked against actual measurement of a sample of trees. The trees contributing to these tables were assumed to be of average taper, but since they came from a limited area it would be desirable to check them against measurements from other areas.

All volumes are gross and include all wood to the indicated top d.i.b. regardless of crook, rot, excessive limbiness, or other defect. Allowance must be made for all nonmerchantable material larger than the top d.i.b. if an estimate of net volume is desired.

CONVERTING CUBIC FEET TO CORDS

Most sales of cordwood are by the standard stacked cord -- 4 x 4 x 8 feet. Wood may be either peeled or unpeeled ("rough"), depending on local practice or the timber-sale contract.

The number of cubic feet of actual wood per cord depends on the following:

- Wood peeled or rough
- Wood split or unsplit
- Length of pieces
- Variation in diameter of individual pieces
- Average diameter of individual pieces
- Straightness and smoothness of individual pieces
- Care used in piling, and "shakedown" in transit

Conversion from cubic feet to cords requires data on the effect of each of these factors. Local data would be most desirable, but none are available for southwestern ponderosa pine. It is therefore necessary to adapt data from other regions and species into provisional conversion factors for our area.

The biggest differences in computing cord volumes from cubic-foot volumes come between wood peeled before stacking and wood not peeled.

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[3] Volumes computed for blackjacks in the 6-inch d.b.h. class often exceeded the volume of a cylinder with the stump as its base. Volumes computed for shortest height classes were often very small in the larger diameter classes.

CONVERSION OF CUBIC FEET TO PEELED CORDS

The following table shows how the number of cubic feet of solid material per cord varied in a 1935 study made by the Lakes States Forest Experiment Station. These figures can be used as temporary factors in converting cubic feet to peeled cords in the Southwest.

Table A.--Solid content of the stacked cord of Lake States softwoods

Character of bolts	Volume per standard cord of bolts of indicated length having middle diameter of--					
	Less than 6 in.		6 to 12 in.		More than 12 in.	
	4 ft.	8 ft.	4 ft.	8 ft.	4 ft.	8 ft.
	- - - - - -	- - - - - -	Cubic feet	- - - - - -		
Straight						
Smooth	90	88	95	93	100	98
Slightly rough	88	85	93	91	98	96
Slightly rough and knotty	84	80	91	88	96	94
Not straight						
Slightly crooked and rough	80	76	88	84	93	91
Considerably crooked	76	72	85	80	90	87
Crooked, rough, and knotty	70	65	79	75	83	80

Although both cubic-foot and cord data in table A are for unpeeled wood, the ratios should be about the same between peeled cubic feet and peeled cords, since no allowance needs to be made for bark in either case.

Since our volume tables are for cubic feet inside bark, table A can be used directly in converting to cords of peeled wood. Cubic feet are divided by the appropriate factor to get cords of peeled wood.

CONVERSION OF CUBIC FEET TO UNPEELED CORDS

Converting estimates of cubic feet of peeled wood to cords of unpeeled wood requires allowance for bark volumes. Table B presents provisional ratios of $\frac{\text{peeled volume}}{\text{unpeeled volume}}$. Table B was developed following a suggestion by Meyer[4] (pp. 67-71) that starts with the square of the $\frac{\text{d.i.b.}}{\text{d.o.b.}}$ ratio for the average stick and adjusts it for compression of bark in the pile and other factors.

The number of cubic feet of peeled wood in an unpeeled cord is estimated by multiplying the appropriate cubic-foot figure from table A by the appropriate ratio from table B. Cubic-foot volume is divided by this last figure (table A times table B) to get the estimate of unpeeled cords.

Table B.--Ratios of peeled wood volume to unpeeled wood volume by diameter classes

Diameter outside bark at midpoint of stick	Blackjacks	Yellow pines and intermediates	Diameter outside bark at midpoint of stick	Blackjacks	Yellow pines and intermediates
Inches			Inches		
6	0.78	--	22	0.84	0.86
8	.78	--	24	.85	.87
10	.79	0.79	26	.86	.88
12	.80	.80	28	.87	.89
14	.81	.81	30	.87	.90
16	.82	.82	32-34	--	.92
18	.82	.84	36-38	--	.94
20	.83	.85	40+	--	.96

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[4] Meyer, H. Arthur. Forest mensuration. 357 pp., illus. State College, Pa. 1953.

OTHER ADJUSTMENTS

The preceding discussion assumes measurement of wood as stacked. If it is measured on trucks or railroad cars at point of delivery, stacked volumes may be 5 to 10 percent less because of shakedown in transit.

EXAMPLE OF CONVERSION COMPUTATION

The following example illustrates how a cubic-foot estimate would be converted to both peeled and unpeeled cords (wood to be measured in 4-foot lengths, average middle diameter of stick 9 inches outside bark, straight and slightly rough, some slightly rough and knotty):

Gross estimated peeled wood computed from volume table	200,000 cu. ft.
Estimated cull, excessive crook, and limbiness	4 percent
Net volume (200,000 x 0.96)	192,000 cu. ft.
Estimated solid content of stacked cord (from table A)	92 cu. ft.

$$\text{Estimated volume peeled wood} = \frac{192,000}{92} = 2,087 \text{ cords}$$

Peeled/unpeeled ratio (from table B)	0.785
Estimated peeled cubic feet in cord of unpeeled wood	92 x 0.785 = 72.2

$$\text{Estimated volume unpeeled wood} = \frac{192,000}{72.2} = 2,659 \text{ cords}$$

Note that estimates of the following factors are needed to convert cubic feet inside bark to cords:

1. Cull and "unmerchantability" of all material over 4.0 inches d.i.b.
2. Length in which wood will be cut.
3. Average middle diameter of sticks.
4. Relative straightness, roughness, and knottiness.

Detailed tallies of these factors should not be needed. Estimated averages should be adequate.

Table 1a.--Immature ponderosa pine (blackjacks), Arizona

Cubic feet inside bark
Volume to 4.0-inch top diameter inside bark

Total height
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when total height is:												Basis: No. trees
O.b.	I.b.	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	
In.	In.													
6	4.64	0.6	0.8	1.1	1.5	1.9	2.2	2.5						15
7	5.51	.9	1.3	1.9	2.6	3.3	4.0	4.6						12
8	6.38		1.8	2.7	3.8	4.9	5.9	6.8	7.8					15
9	7.25		2.4	3.6	5.1	6.6	8.0	9.3	10.6					14
10	8.12		3.0	4.6	6.6	8.5	10.3	12.0	13.6	15.2				9
11	8.99			5.6	8.1	10.5	12.7	14.9	16.9	18.8				10
12	9.86			6.8	9.8	12.7	15.4	18.0	20.5	22.8				12
13	10.73			8.0	11.6	15.0	18.2	21.3	24.3	27.0	29.7			9
14	11.60			9.3	13.5	17.5	21.3	24.9	28.3	31.5	34.6			12
15	12.47			10.7	15.5	20.1	24.4	28.6	32.6	36.3	39.8			10
16	13.34			12.1	17.5	22.8	27.8	32.5	37.0	41.2	45.2			10
17	14.21			13.6	19.8	25.7	31.3	36.7	41.8	46.5	51.1	55.3		7
18	15.08				22.1	28.8	35.1	41.1	46.8	52.1	57.2	62.0		13
19	15.95				24.5	31.9	38.9	45.5	51.9	57.8	63.4	68.7		5
20	16.82				27.1	35.3	43.0	50.4	57.4	63.9	70.2	76.0	81.8	5
21	17.69					38.7	47.1	55.2	62.9	70.1	76.9	83.3	89.6	3
22	18.56					42.3	51.6	60.5	68.9	76.8	84.3	91.3	98.1	3
23	19.43					46.0	56.1	65.7	74.9	83.5	91.6	99.2	106.7	4
24	20.30					50.0	60.9	71.4	81.3	90.6	99.5	107.8	115.9	1
25	21.17					54.1	65.9	77.3	88.0	98.1	107.7	116.7	125.4	1
26	22.04					58.2	71.0	83.2	94.7	105.6	115.9	125.6	135.0	1
27	22.91					62.6	76.3	89.5	101.9	113.6	124.7	135.1	145.3	1
28	23.78						81.7	95.7	109.0	121.5	133.4	144.5	155.4	1
29	24.64						87.4	102.4	116.6	130.0	142.7	154.6	166.3	2
30	25.51						93.2	109.2	124.4	138.7	152.3	165.0	177.4	
31	26.38						99.0	116.1	132.2	147.4	161.8	175.3	188.5	
32	27.25							123.1	140.2	156.3	171.6	185.9	199.9	
33	28.12							130.5	148.7	165.7	182.0	197.1	212.0	
34	28.99							138.4	157.6	175.7	193.0	209.0	224.8	
35	29.86							146.4	166.8	185.9	204.1	221.1	237.8	
Basis:	No. trees		12	17	14	40	38	30	19	5				175

Block indicates extent of basic data.
Aggregate deviation = 1.01% low.
Average deviation = 9.92%.

Table 1b.--Mature ponderosa pine (intermediates and yellow pines), Arizona

Cubic feet inside bark	Total height
Volume to 4.0-inch top diameter inside bark	Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when total height is:											Basis: No.
O.b.	I.b.	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	trees
In.	In.												
10	7.94	5.7	7.5	9.3	11.0								
11	8.88	7.3	9.6	11.9	14.1	16.2							2
12	9.82	9.0	11.9	14.8	17.5	20.2	22.7						5
13	10.76	10.9	14.5	17.9	21.2	24.5	27.5	30.5					5
14	11.70	12.9	17.1	21.2	25.2	29.1	32.7	36.3					7
15	12.64	15.1	20.1	24.9	29.5	34.1	38.5	42.6	46.5				6
16	13.58	17.4	23.2	28.7	34.1	39.4	44.3	49.2	53.7				19
17	14.52	19.9	26.5	32.9	39.1	45.1	50.8	56.3	61.5	66.6			16
18	15.46	22.6	30.1	37.3	44.3	51.1	57.5	63.8	69.7	75.5			17
19	16.39	25.4	33.8	41.9	49.8	57.5	64.7	71.8	78.4	85.0	91.1		18
20	17.33	28.4	37.8	46.9	55.7	64.3	72.4	80.3	87.7	95.1	101.9		21
21	18.27		41.8	51.9	61.7	71.2	80.2	89.0	97.2	105.3	113.0	120.4	19
22	19.21		46.2	57.4	68.2	78.7	88.7	98.4	107.4	116.5	124.9	133.1	20
23	20.15		50.8	63.1	75.0	86.5	97.5	108.1	118.1	128.0	137.3	146.2	16
24	21.09		55.7	69.1	82.2	94.8	106.9	118.5	129.5	140.4	150.5	160.4	18
25	22.03		60.7	75.4	89.6	103.4	116.5	129.2	141.1	153.0	164.1	174.8	20
26	22.97		65.9	81.8	97.2	112.2	126.4	140.2	153.2	166.1	178.1	189.8	11
27	23.91		71.3	88.6	105.3	121.5	136.9	151.9	165.9	179.9	192.9	205.5	15
28	24.85		77.0	95.6	113.7	131.2	147.8	164.0	179.1	194.2	208.3	221.9	15
29	25.79			102.9	122.3	141.1	159.0	176.4	192.7	208.9	224.1	238.8	9
30	26.73			110.7	131.7	151.9	171.2	189.9	207.5	224.9	241.2	257.0	13
31	27.67			118.4	140.8	162.4	183.1	203.1	221.8	240.5	257.9	274.8	3
32	28.61			126.6	150.5	173.7	195.8	217.2	237.2	257.2	275.9	293.9	4
33	29.55			134.9	160.4	185.1	208.7	231.5	252.8	274.1	294.0	313.3	2
34	30.49			143.8	171.0	197.4	222.4	246.7	269.5	292.2	313.4	334.0	1
35	31.43				181.6	209.6	236.2	262.1	286.3	310.4	332.9	354.7	3
36	32.37				193.0	222.7	251.0	278.4	304.1	329.8	353.6	376.8	2
37	33.31				204.3	235.8	265.8	294.8	322.0	349.2	374.5	399.1	1
38	34.25				216.3	249.6	281.4	312.1	340.9	369.7	396.5	422.5	1
39	35.19				228.2	263.4	296.9	329.3	359.7	390.1	418.3	445.8	2
40	36.13				240.8	277.9	313.3	347.5	379.6	411.6	441.5	470.4	
41	37.07					292.1	329.2	365.2	399.0	432.6	464.0	494.4	1
42	38.00					307.3	346.3	384.2	419.7	455.1	488.1	520.1	
43	38.94					323.1	364.2	404.0	441.4	478.6	513.3	546.9	
44	39.88					339.9	383.1	425.0	464.3	503.5	539.9	575.3	
45	40.82					356.0	401.3	445.1	486.3	527.3	565.5	602.6	
46	41.76					373.1	420.5	466.5	509.6	552.6	592.7	631.5	
47	42.70					391.1	440.9	489.1	534.2	579.3	621.3	662.1	
Basis: No. trees			4	22	60	98	78	21	9				292

Block indicates extent of basic data.
Aggregate deviation = 0.40% low.
Average deviation = 7.70%.

Table 2a.--Immature ponderosa pine (blackjacks), Arizona

Cubic feet inside bark
Volume to 4.0-inch top diameter inside bark

Height to 4.0 inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when height to 4.0 inches d.i.b. is:													Basis: No.
O.b.	I.b.	8'	16'	24'	32'	40'	48'	56'	64'	72'	80'	88'	96'	104'	trees
In.	In.														
6	4.64	0.9	1.8	2.7	3.5	4.3									5
7	5.51	1.2	2.3	3.5	4.4	5.4									11
8	6.38	1.6	2.9	4.3	5.5	6.7	7.8								15
9	7.25	2.0	3.5	5.2	6.7	8.1	9.3	10.5							14
10	8.12	2.4	4.1	6.2	8.0	9.6	11.2	12.6	14.0						9
11	8.99		4.8	7.3	9.4	11.4	13.3	15.0	16.6	18.2					10
12	9.86		5.6	8.5	11.1	13.4	15.6	17.6	19.6	21.4					12
13	10.73		6.5	9.8	12.8	15.6	18.1	20.5	22.8	25.0	27.1				9
14	11.60		7.5	11.3	14.8	18.0	20.9	23.7	26.4	28.9	31.3				12
15	12.47		8.5	12.9	16.9	20.6	24.0	27.1	30.2	33.1	35.9	38.7			10
16	13.34			14.6	19.2	23.4	27.3	30.9	34.4	37.8	41.0	44.1			10
17	14.21			16.5	21.8	26.6	31.0	35.2	39.1	42.9	46.6	50.2			7
18	15.08			18.4	24.3	29.7	34.6	39.3	43.7	48.0	52.1	56.1			13
19	15.95			20.6	27.2	33.2	38.7	44.0	49.0	53.7	58.3	62.8			5
20	16.82			22.9	30.3	36.9	43.1	49.0	54.5	59.9	65.0	70.0			5
21	17.69				33.4	40.8	47.7	54.1	60.3	66.2	71.9	77.4	82.7		3
22	18.56				36.9	45.0	52.6	59.7	66.5	73.0	79.3	85.4	91.3		3
23	19.43				40.4	49.4	57.7	65.6	73.0	80.2	87.1	93.8	100.2		4
24	20.30				44.3	54.1	63.2	71.8	80.0	87.9	95.4	102.8	109.8		1
25	21.17				48.2	59.0	68.9	78.3	87.2	95.8	104.0	112.1	119.8	127.4	1
26	22.04					63.9	74.8	84.9	94.6	103.9	112.9	121.6	129.9	138.2	1
27	22.91					69.3	81.1	92.1	102.7	112.7	122.5	131.9	141.0	149.9	1
28	23.78					75.0	87.7	99.7	111.1	122.0	132.5	142.8	152.6	162.3	1
29	24.64					80.8	94.5	107.3	119.6	131.4	142.7	153.8	164.3	174.8	2
30	25.51					86.8	101.5	115.3	128.5	141.2	153.3	165.2	176.6	187.8	
31	26.38						108.7	123.6	137.7	151.3	164.3	177.1	189.2	201.3	
32	27.25						116.3	132.1	147.3	161.8	175.8	189.4	202.4	215.3	
33	28.12						124.6	141.6	157.8	173.4	188.3	202.9	216.9	230.7	
34	28.99						132.9	151.0	168.3	184.9	200.9	216.4	231.3	246.1	
35	29.86						141.3	160.6	179.1	196.7	213.7	230.3	246.1	261.8	
Basis: No. trees		2	16	14	18	33	22	20	25	11	3				164

Block indicates extent of basic data.
Aggregate deviation = 0.37% low.
Average deviation = 7.06%.

Table 2b.--Mature ponderosa pine (yellow pines and intermediates), Arizona

Cubic feet inside bark
Volume to 4.0-inch top diameter inside bark

Height to 4.0 inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when height to 4.0 inches d.i.b. is:															Basis: No. trees
O.b.	I.b.	16'	24'	32'	40'	48'	56'	64'	72'	80'	88'	96'	104'	112'	120'	128'	
In.	In.																
10	7.94	3.7	5.5	7.5	9.6	11.5	13.4	15.3									
11	8.88	4.5	6.6	8.9	11.3	13.7	16.0	18.2	20.4								2
12	9.82	5.2	7.7	10.4	13.3	16.1	18.8	21.5	24.1								5
13	10.76	6.1	8.9	12.1	15.5	18.7	21.9	25.1	28.2	31.2							5
14	11.70	7.1	10.3	14.0	17.8	21.6	25.3	28.9	32.5	36.1	39.6						7
15	12.64	8.2	11.9	16.0	20.4	24.8	29.0	33.2	37.3	41.4	45.4						6
16	13.58		13.5	18.3	23.2	28.2	33.0	37.8	42.5	47.1	51.7						19
17	14.52		15.3	20.7	26.2	31.8	37.3	42.7	48.0	53.3	58.5	63:6					16
18	15.46		17.1	23.1	29.3	35.7	41.9	47.9	53.9	59.8	65.7	71.4					17
19	16.39		19.1	25.8	32.6	39.7	46.6	53.4	60.0	66.6	73.1	79.5	86.1				18
20	17.33		21.3	28.5	36.2	44.0	51.7	59.2	66.7	74.0	81.3	88.3	95.6				21
21	18.27			31.4	40.0	48.7	57.1	65.5	73.7	81.8	89.8	97.7	105.6	113.4			19
22	19.21			34.6	43.9	53.4	62.7	71.9	81.0	89.8	98.7	107.3	116.0	124.8			20
23	20.15			37.9	48.1	58.5	68.7	78.8	88.7	98.4	108.2	117.6	127.1	136.7	146.1		16
24	21.09			41.4	52.5	64.0	75.1	86.2	97.0	107.7	118.3	128.6	139.1	149.3	159.4		18
25	22.03			44.9	57.0	69.5	81.6	93.6	105.3	116.9	128.5	139.7	151.0	162.2	173.4	184.4	20
26	22.97				61.7	75.2	88.4	101.4	114.1	126.7	139.2	151.4	163.7	175.8	188.5	200.0	11
27	23.91				66.7	81.3	95.5	109.6	123.4	137.0	150.5	163.7	176.9	190.1	203.3	216.1	15
28	24.85				71.9	87.7	103.1	118.2	133.1	147.7	162.4	176.6	190.9	205.1	219.0	233.0	15
29	25.79				77.2	94.1	110.6	126.9	142.9	158.6	174.3	189.6	205.0	220.2	235.2	250.4	9
30	26.73				82.9	101.0	118.8	136.3	153.4	170.3	187.2	203.6	220.1	236.5	252.6	268.6	13
31	27.67				88.6	108.0	126.9	145.6	164.0	182.1	200.1	217.7	235.3	252.8	270.0	287.2	3
32	28.61				94.4	115.1	135.4	155.6	174.9	194.2	213.4	232.1	251.0	269.7	288.0	306.3	4
33	29.55					122.8	144.3	165.6	186.5	207.1	227.6	247.6	267.6	287.6	307.1	326.7	2
34	30.49					130.6	153.6	176.2	198.4	220.3	242.2	263.4	284.8	306.1	326.8	347.6	1
35	31.43					138.7	163.0	187.0	210.7	233.9	257.1	279.7	302.3	324.9	347.0	369.1	3
36	32.37					146.9	172.7	198.1	223.1	247.8	272.3	296.2	320.3	344.2	367.6	390.9	2
37	33.31					155.2	182.5	209.3	235.8	261.8	287.8	313.0	338.5	363.7	388.4	413.1	1
38	34.25					164.0	192.8	221.2	249.2	276.7	304.1	330.8	357.7	384.3	410.5	436.6	1
39	35.19					172.8	203.3	233.2	262.7	291.7	320.7	348.8	377.1	405.3	432.8	460.3	2
40	36.13					182.3	214.3	245.9	277.0	307.6	338.1	367.8	397.6	427.3	456.3	485.4	
41	37.07						225.4	258.6	291.4	323.5	355.6	386.9	418.3	449.5	480.1	510.6	1
42	38.00						236.6	271.5	305.8	339.5	373.3	406.0	439.0	471.8	503.9	535.9	
43	38.94						248.3	284.9	321.0	356.4	391.7	426.2	460.7	495.1	528.8	562.5	
44	39.88						260.6	299.0	336.8	374.0	411.1	447.3	483.6	519.7	555.1	590.4	
45	40.82						273.0	313.1	352.7	391.6	430.5	468.3	506.4	544.2	581.2	618.1	
46	41.76						285.6	327.7	369.2	410.1	450.5	490.5	530.2	569.4	608.4	647.1	
47	42.70						298.4	342.5	385.8	428.5	470.9	512.4	554.1	595.4	635.9	676.3	
Basis: No. trees					5	14	31	51	80	67	29	13	2				292

Block indicates extent of basic data.
Aggregate deviation = 0.23% low.
Average deviation = 6.60%.

Table 3a.--Immature ponderosa pine (blackjacks), Arizona

Cubic feet inside bark
Volume to 4.0-inch top diameter inside bark

Height to 8.0-inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when height to 8.0 inches d.i.b. is:											Basis: No. trees
O.b.	I.b.	1.0 log*	1.5 logs	2.0 logs	2.5 logs	3.0 logs	3.5 logs	4.0 logs	4.5 logs	5.0 logs	5.5 logs	6.0 logs	
In.	In.												
11	8.99	10.9	15.3	19.5	23.1	26.0	28.2						4
12	9.86	11.4	16.1	20.5	24.2	27.3	29.7						10
13	10.73	11.9	17.0	21.8	25.7	28.9	31.7	34.3					9
14	11.60	12.7	18.1	23.4	27.7	31.0	34.2	37.0					12
15	12.47	13.5	19.3	25.3	29.7	33.6	37.0	40.1	43.1				10
16	13.34	14.5	20.8	27.1	32.1	36.4	40.2	43.8	47.1				10
17	14.21	15.4	22.3	29.3	34.8	39.6	43.9	47.9	51.5	55.1			7
18	15.08	16.6	23.8	31.6	37.9	43.3	48.0	52.5	56.5	60.5			13
19	15.95	17.7	25.5	34.2	41.2	47.2	52.6	57.5	62.1	66.4	70.5		5
20	16.82	19.0	27.4	37.2	44.9	51.5	57.6	63.0	68.1	72.9	77.4		5
21	17.69	20.4	29.6	40.3	48.9	56.3	63.0	69.0	74.7	80.0	85.0	89.8	3
22	18.56	22.0	31.9	43.8	53.2	61.5	68.8	75.5	81.8	87.6	93.2	98.5	3
23	19.43	23.7	34.4	47.5	58.0	67.0	75.2	82.6	89.5	96.0	102.1	107.9	4
24	20.30	25.5	37.0	51.5	63.0	73.0	81.9	90.0	97.6	104.8	111.5	118.0	1
25	21.17		39.9	55.7	68.5	79.3	89.1	98.1	106.4	114.3	121.6	128.7	1
26	22.04		43.0	60.3	74.2	86.2	96.9	106.7	115.8	124.3	132.5	140.3	1
27	22.91		46.2	65.3	80.4	93.4	105.1	115.9	125.8	135.1	144.0	152.5	1
28	23.78		49.8	70.4	86.9	101.1	113.9	125.6	136.5	146.6	156.3	165.5	1
29	24.64			75.8	93.7	109.2	123.0	135.7	147.5	158.5	169.1	179.0	2
30	25.51			81.7	101.1	117.8	132.8	146.6	159.4	171.3	182.8	193.7	
31	26.38			87.8	108.8	126.9	143.2	158.0	171.9	184.9	197.2	209.0	
32	27.25			94.2	116.9	136.4	154.0	170.1	185.0	199.1	212.3	225.1	
33	28.12				125.5	146.6	165.5	182.8	198.9	214.0	228.4	242.0	
34	28.99				134.4	157.1	177.5	196.1	213.4	229.8	245.2	259.8	
35	29.86				143.9	168.3	190.1	210.1	228.7	246.2	262.7	278.6	
Basis: No. trees		4	23	23	14	21	12	4	1				102

*Logs are 16.3-feet long.
Block indicates extent of basic data.
Aggregate deviation = 0.30% high.
Average deviation = 6.36%.

Table 3b.--Mature ponderosa pine (yellow pines and intermediates), Arizona

Cubic feet inside bark
Volume to 4.0-inch top diameter inside bark

Height to 8.0-inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 4.0-inch top d.i.b. when height to 8.0-inches d.i.b. is:														Basis: No. trees
O.b.	I.b.	1.0 log*	1.5 logs	2.0 logs	2.5 logs	3.0 logs	3.5 logs	4.0 logs	4.5 logs	5.0 logs	5.5 logs	6.0 logs	6.5 logs	7.0 logs	7.5 logs	8.0 logs	
In.	In.																
11	8.88	12.0	15.4	18.8	22.1	25.5											
12	9.82	12.5	16.3	20.1	23.9	27.5											5
13	10.76	13.1	17.3	21.7	25.9	30.1	34.3	37.6									5
14	11.70	13.8	18.7	23.4	28.3	33.0	37.2	40.9									7
15	12.64	14.7	20.1	25.5	30.8	36.0	40.6	44.8	48.8								6
16	13.58	15.7	21.6	27.6	33.6	39.3	44.4	49.0	53.5								19
17	14.52	16.8	23.2	29.9	36.7	42.8	48.4	53.7	58.7	63.6							16
18	15.46	18.0	25.1	32.2	39.8	46.6	52.8	58.8	64.4	69.8							17
19	16.39	19.3	26.9	34.7	43.1	50.7	57.8	64.4	70.6	76.5	82.3						18
20	17.33	20.7	28.9	37.4	46.8	55.1	62.9	70.2	77.2	83.8	90.2						21
21	18.27		31.0	40.4	50.7	60.1	68.7	76.8	84.5	91.9	98.8	105.7					19
22	19.21		33.2	43.5	54.9	65.2	74.7	83.5	91.9	100.0	107.8	115.3					20
23	20.15		35.7	46.9	59.4	70.7	81.1	90.8	100.1	109.0	117.5	125.8					16
24	21.09		38.3	50.4	64.2	76.5	87.9	98.5	108.7	118.4	127.7	136.8	145.6				18
25	22.03		41.2	54.3	69.3	82.8	95.3	106.9	118.0	128.6	138.8	148.7	158.4				20
26	22.97			58.3	74.7	89.3	102.9	115.6	127.7	139.3	150.3	161.0	171.6				11
27	23.91			62.6	80.3	96.2	110.9	124.7	137.8	150.4	162.4	174.1	185.5				15
28	24.85			67.1	86.2	103.5	119.3	134.2	148.4	162.0	175.0	187.6	200.0	211.7			15
29	25.79			71.9	92.6	111.2	128.5	144.6	159.9	174.5	188.6	202.3	215.7	228.3			9
30	26.73			76.7	99.0	119.1	137.7	155.0	171.6	187.3	202.5	217.2	231.6	245.2			13
31	27.67				106.0	127.6	147.6	166.2	184.0	201.0	217.3	233.1	248.6	263.3	277.8		3
32	28.61				113.2	136.4	157.8	177.9	197.0	215.2	232.7	249.8	266.4	282.1	297.7		4
33	29.55				120.7	145.5	168.5	189.9	210.3	229.8	248.6	266.8	284.6	301.4	318.2		2
34	30.49				128.3	154.8	179.3	202.2	224.1	245.0	265.0	284.5	303.5	321.4	339.3	356.5	1
35	31.43					164.8	191.0	215.5	238.8	261.0	282.4	303.2	323.5	342.6	361.7	380.1	3
36	32.37					175.0	202.9	229.0	253.8	277.5	300.3	322.5	344.1	364.5	384.8	404.5	2
37	33.31					185.9	215.6	243.4	269.9	295.1	319.4	342.9	366.0	387.7	409.3	430.3	1
38	34.25					196.6	228.1	257.4	285.4	312.2	337.8	362.8	387.2	410.3	433.2	455.3	1
39	35.19						241.8	273.0	302.8	331.2	358.5	385.1	411.0	435.4	459.8	483.3	2
40	36.13						255.0	288.0	319.6	349.6	378.4	406.5	433.9	459.6	485.3	510.2	
41	37.07						269.7	304.7	338.1	369.9	400.4	430.1	459.2	486.5	513.8	540.2	1
42	38.00						283.9	320.7	355.9	389.4	421.7	453.0	483.6	512.4	541.1	568.9	
43	38.94						299.7	338.6	375.8	411.2	445.2	478.3	510.7	541.1	571.5	600.9	
44	39.88						315.4	356.5	395.7	433.0	468.9	503.7	537.8	569.8	601.8	632.8	
45	40.82						331.3	374.3	415.5	454.7	492.4	529.1	564.9	598.7	632.3	664.9	
46	41.76						347.7	393.1	436.3	477.6	517.2	555.8	593.4	628.9	664.3	698.4	
47	42.70						365.2	412.8	458.4	501.7	543.4	583.9	623.5	660.8	698.0	733.9	
Basis: No. trees		1	7	16	28	50	59	68	38	18	4	1					290

*Logs are 16.3-feet long.
Block indicates extent of basic data.
Aggregate deviation = 0.03% low.
Average deviation = 5.50%.

Table 4a.--Immature ponderosa pine (blackjacks), Arizona

Cubic feet inside bark	Total height
Volume to 8.0-inch top diameter inside bark	Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 8.0-inch top d.i.b. when total height is:										Basis: No. trees
O.b.	I.b.	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	trees
In.	In.											
11	8.99	3.1	4.6	5.9	7.1	8.2	9.1	9.8				10
12	9.86	4.6	6.7	8.8	10.5	12.2	13.7	15.0				12
13	10.73	6.1	8.9	11.6	14.0	16.2	18.4	20.2	22.1			9
14	11.60	7,6	11.1	14.5	17.5	20.4	23.1	25.5	27.8			12
15	12.47	9.2	13.4	17.4	21.1	24.6	28.0	31.0	33.8			10
16	13.34	10.7	15.6	20.4	24.8	28.9	32.8	36.4	39.8			10
17	14.21	12.4	18.1	23.5	28.6	33.5	38.0	42.2	46.2	49.9		7
18	15.08		20.5	26.8	32.6	38.1	43.4	48.2	52.8	57.0		13
19	15.95		23.1	30.1	36.6	42.8	48.8	54.2	59.3	64.2		5
20	16.82		25.8	33.6	40.9	47.9	54.5	60.6	66.5	71.8	77.2	5
21	17.69			37.1	45.2	52.9	60.2	67.1	73.5	79.5	85.4	3
22	18.56			40.9	49.8	58.4	66.4	74.0	81.1	87.7	94.2	3
23	19.43			44.7	54.5	63.7	72.6	80.9	88.6	95.9	103.0	4
24	20.30			48.8	59.4	69.6	79.2	88.2	96.7	104.7	112.5	1
25	21.17			52.9	64.5	75.6	86.0	95.8	105.1	113.8	122.2	1
26	22.04			57.1	69.6	81.6	92.8	103.4	113.5	122.9	132.0	1
27	22.91			61.6	75.0	88.0	100.1	111.6	122.4	132.5	142.5	1
28	23.78				80.5	94.3	107.3	119.6	131.2	142.1	152.7	1
29	24.64				86.3	101.0	115.0	128.2	140.7	152.3	163.8	2
30	25.51				92.1	107.9	122.9	137.0	150.4	162.9	175.0	
31	26.38				98.0	114.9	130.8	145.8	160.0	173.3	186.3	
32	27.25					121.9	138.9	154.8	169.9	184.0	197.8	
33	28.12					129.4	147.4	164.2	180.4	195.3	210.0	
34	28.99					137.4	156.4	174.3	191.4	207.2	222.9	
35	29.86					145.4	165.6	184.6	202.6	219.4	236.0	
Basis: No. trees			1	25	30	30	19	5				110

Block indicates extent of basic data.
Aggregate deviation = 2.75% low.
Average deviation = 11.08%.

Table 4b.--Mature ponderosa pine (intermediates and yellow pine), Arizona

Cubic feet inside bark
Volume to 8.0-inch top diameter inside bark

Total height
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 8.0-inch top d.i.b. when total height is:											Basis: No. trees
O.b.	I.b.	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	
In.	In.												
10	7.94	1.1	2.2	3.3	4.3								
11	8.88	3.4	5.1	6.7	8.4	9.9							2
12	9.82	5.6	8.0	10.3	12.5	14.7	16.8						5
13	10.76	7.9	11.0	14.0	16.8	19.7	22.3	24.9					5
14	11.70	10.3	14.0	17.7	21.3	24.8	28.1	31.3					7
15	12.64	12.7	17.4	21.8	26.0	30.3	34.4	38.1	41.7				6
16	13.58	15.3	20.7	25.9	31.0	36.0	40.6	45.2	49.4				19
17	14.52	18.0	24.2	30.3	36.3	42.0	47.4	52.6	57.6	62.4			16
18	15.46	20.8	28.0	35.0	41.7	48.2	54.4	60.5	66.1	71.7			17
19	16.39	23.8	31.9	39.7	47.4	54.9	61.8	68.7	75.1	81.5	87.4		18
20	17.33	26.9	36.0	44.9	53.5	61.9	69.8	77.5	84.7	91.9	98.5		21
21	18.27		40.2	50.1	59.6	68.9	77.8	86.4	94.4	102.3	109.8	117.1	19
22	19.21		44.7	55.7	66.3	76.6	86.4	95.9	104.8	113.7	122.0	130.0	20
23	20.15		49.4	61.5	73.2	84.5	95.4	105.8	115.6	125.4	134.5	143.3	16
24	21.09		54.4	67.6	80.5	93.0	104.9	116.3	127.2	138.0	147.9	157.7	18
25	22.03		59.5	74.0	88.0	101.7	114.6	127.2	138.9	150.7	161.7	172.2	20
26	22.97		64.7	80.5	95.7	110.6	124.6	138.3	151.2	163.9	175.8	187.4	11
27	23.91		70.2	87.3	103.9	120.0	135.2	150.1	164.0	177.9	190.7	203.2	15
28	24.85		75.9	94.4	112.4	129.7	146.2	162.3	177.3	192.3	206.3	219.7	15
29	25.79			101.8	121.0	139.7	157.5	174.8	191.0	207.1	222.2	236.8	9
30	26.73			109.6	130.5	150.6	169.8	188.4	205.9	223.2	239.4	255.1	13
31	27.67			117.4	139.7	161.1	181.7	201.6	220.2	238.8	256.1	273.0	3
32	28.61			125.6	149.4	172.5	194.5	215.8	235.7	255.6	274.2	292.1	4
33	29.55			134.0	159.4	184.0	207.5	230.2	251.4	272.6	292.4	311.6	2
34	30.49			142.9	170.0	196.3	221.2	245.4	268.1	290.8	311.9	332.4	1
35	31.43				180.6	208.6	235.1	260.9	285.0	309.0	331.4	353.2	3
36	32.37				192.1	221.7	249.9	277.2	302.8	328.5	352.2	375.3	2
37	33.31				203.4	234.8	264.8	293.7	320.8	347.9	373.2	397.7	1
38	34.25				215.5	248.7	280.4	311.0	339.7	368.5	395.2	421.1	1
39	35.19				227.4	262.5	295.9	328.3	358.6	388.9	417.1	444.5	2
40	36.13				240.0	277.0	312.4	346.5	378.5	410.5	440.3	469.1	
41	37.07					291.3	328.3	364.2	398.0	431.5	462.8	493.2	1
42	38.00					306.5	345.4	383.3	418.7	454.0	487.0	518.9	
43	38.94					322.3	363.4	403.1	440.4	477.6	512.2	545.8	
44	39.88					339.2	382.3	424.1	463.4	502.5	538.9	574.2	
45	40.82					355.3	400.5	444.3	485.4	526.3	564.5	601.5	
46	41.76					372.4	419.7	465.7	508.7	551.7	591.7	630.5	
47	42.70					390.4	440.2	488.3	533.4	578.4	620.3	661.1	
Basis: No. trees			4	22	60	98	78	21	9				292

Block indicates extent of basic data.
Aggregate deviation = 0.57% low.
Average deviation = 8.84%.

Table 5a.--Immature ponderosa pine (blackjacks), Arizona

Cubic feet inside bark
Volume to 8.0-inch top diameter inside bark

Height to 8.0 inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 8.0-inch top d.i.b. when height to 8.0-inch d.i.b. is:											Basis: No. trees
O.b.	I.b.	1.0 log*	1.5 logs	2.0 logs	2.5 logs	3.0 logs	3.5 logs	4.0 logs	4.5 logs	5.0 logs	5.5 logs	6.0 logs	
In.	In.												
11	8.99	6.6	10.3	14.0	17.1	19.6	21.5						4
12	9.86	7.6	11.7	15.7	19.0	21.7	23.8						10
13	10.73	8.6	13.1	17.5	21.1	24.0	26.5	28.8					9
14	11.60	9.7	14.6	19.6	23.5	26.6	29.5	32.1					12
15	12.47	10.8	16.2	21.8	26.0	29.6	32.8	35.7	38.5				10
16	13.34	12.0	18.0	24.0	28.7	32.8	36.4	39.8	42.9				10
17	14.21	13.2	19.7	26.4	31.7	36.3	40.4	44.2	47.7	51.1			7
18	15.08	14.5	21.4	29.0	35.0	40.2	44.8	49.1	53.0	56.8			13
19	15.95	15.8	23.3	31.8	38.6	44.4	49.6	54.4	58.8	63.0	67.0		5
20	16.82	17.2	25.4	34.9	42.4	48.9	54.8	60.1	65.1	69.8	74.2		5
21	17.69	18.8	27.7	38.2	46.6	53.9	60.4	66.3	71.9	77.1	82.0	86.7	3
22	18.56	20.5	30.1	41.8	51.1	59.2	66.4	73.0	79.2	84.9	90.4	95.6	3
23	19.43	22.3	32.7	45.7	56.0	64.9	72.9	80.2	87.0	93.4	99.4	105.2	4
24	20.30	24.1	35.4	49.8	61.1	71.0	79.8	87.8	95.3	102.4	109.0	115.4	1
25	21.17		38.4	54.1	66.7	77.4	87.1	96.0	104.2	112.0	119.3	126.3	1
26	22.04		41.6	58.8	72.5	84.4	95.0	104.7	113.7	122.2	130.3	138.0	1
27	22.91		44.9	63.8	78.8	91.7	103.3	114.0	123.8	133.1	141.9	150.3	1
28	23.78		48.5	69.0	85.4	99.5	112.2	123.8	134.6	144.7	154.3	163.5	1
29	24.64			74.5	92.3	107.7	121.4	134.0	145.7	156.7	167.2	177.1	2
30	25.51			80.4	99.7	116.4	131.3	145.0	157.7	169.6	181.0	191.8	
31	26.38			86.6	107.5	125.5	141.7	156.5	170.3	183.2	195.5	207.2	
32	27.25			93.1	115.7	135.1	152.6	168.6	183.5	197.5	210.7	223.4	
33	28.12				124.3	145.3	164.2	181.4	197.4	212.5	226.8	240.4	
34	28.99				133.3	155.9	176.2	194.8	212.0	228.3	243.7	258.3	
35	29.86				142.8	167.1	188.9	208.8	227.4	244.8	261.3	277.1	
Basis: No. trees		4	23	23	14	21	12	4	1				102

*Logs are 16.3 feet long.

Block indicates extent of basic data.
Aggregate deviation = 0.40% low.
Average deviation = 5.88%.

Table 5b.--Mature ponderosa pine (intermediates and yellow pines), Arizona

Cubic feet inside bark
Volume to 8.0-inch top diameter inside bark

Height to 8.0 inches d.i.b.
Stump height 1 foot

D.b.h.		Cubic-foot volume inside bark between 1-foot-high stump and 8.0-inch top d.i.b. when height to 8.0-inch d.i.b. is:															Basis: No. trees
O.b.	I.b.	1.0 log*	1.5 logs	2.0 logs	2.5 logs	3.0 logs	3.5 logs	4.0 logs	4.5 logs	5.0 logs	5.5 logs	6.0 logs	6.5 logs	7.0 logs	7.5 logs	8.0 logs	
In.	In.																
11	8.88	6.7	10.2	13.6	17.0	20.4											
12	9.82	7.7	11.6	15.5	19.3	23.0											5
13	10.76	8.7	13.1	17.5	21.8	26.0	30.2	33.5									5
14	11.70	9.9	14.8	19.6	24.5	29.2	33.5	37.2									7
15	12.64	11.1	16.5	22.0	27.3	32.6	37.2	41.4	45.4								6
16	13.58	12.4	18.3	24.4	30.4	36.1	41.2	45.9	50.4								19
17	14.52	13.7	20.2	26.9	33.7	39.8	45.5	50.8	55.8	60.7							16
18	15.46	15.1	22.2	29.4	37.0	43.8	50.1	56.1	61.7	67.1							17
19	16.39	16.6	24.2	32.1	40.5	48.1	55.2	61.8	68.0	74.0	79.8						18
20	17.33	18.1	26.4	34.9	44.3	52.7	60.5	67.8	74.8	81.4	87.8						21
21	18.27		28.6	38.1	48.4	57.8	66.4	74.5	82.2	89.6	96.6	103.5					19
22	19.21		31.0	41.3	52.7	63.0	72.5	81.3	89.8	97.9	105.7	113.2					20
23	20.15		33.6	44.8	57.3	68.6	79.1	88.8	98.1	107.0	115.5	123.8					16
24	21.09		36.3	48.4	62.2	74.5	85.9	96.6	106.8	116.5	125.8	134.9	143.7				18
25	22.03		39.3	52.4	67.4	80.9	93.4	105.1	116.2	126.8	137.0	146.9	156.6				20
26	22.97			56.5	72.9	87.5	101.1	113.8	125.9	137.5	148.6	159.3	169.9				11
27	23.91			60.9	78.6	94.5	109.2	123.0	136.1	148.7	160.7	172.4	183.8				15
28	24.85			65.4	84.5	101.8	117.7	132.6	146.8	160.4	173.4	186.0	198.4	210.1			15
29	25.79			70.3	91.0	109.6	126.9	143.0	158.4	173.0	187.1	200.8	214.2	226.8			9
30	26.73			75.2	97.5	117.6	136.2	153.5	170.1	185.8	201.0	215.7	230.1	243.7			13
31	27.67				104.5	126.1	146.1	164.8	182.6	199.6	215.9	231.7	247.2	261.9	276.4		3
32	28.61				111.8	135.0	156.4	176.5	195.6	213.8	231.3	248.4	265.0	280.7	296.3		4
33	29.55				119.3	144.1	167.1	188.5	209.0	228.5	247.3	265.5	283.3	300.1	316.9		2
34	30.49				127.0	153.5	178.0	200.9	222.8	243.7	263.7	283.2	302.2	320.1	338.0	355.2	1
35	31.43					163.5	189.7	214.2	237.5	259.8	281.2	302.0	322.3	341.4	360.5	378.9	3
36	32.37					173.8	201.7	227.8	252.6	276.3	299.1	321.3	342.9	363.3	383.6	403.3	2
37	33.31					184.7	214.4	242.2	268.7	293.9	318.2	341.7	364.8	386.5	408.1	429.1	1
38	34.25					195.4	226.9	256.3	284.3	311.1	336.7	361.7	386.1	409.2	432.1	454.2	1
39	35.19						240.7	271.9	301.7	330.1	357.4	384.0	409.9	434.3	458.7	482.2	2
40	36.13						253.9	286.9	318.5	348.5	377.3	405.4	432.8	458.6	484.3	509.2	
41	37.07						268.7	303.7	337.1	368.9	399.4	429.1	458.2	485.5	512.8	539.2	1
42	38.00						282.9	319.7	354.9	388.4	420.7	452.0	482.6	511.4	540.1	567.9	
43	38.94						298.7	337.6	374.8	410.2	444.2	477.3	509.7	540.1	570.5	599.9	
44	39.88						314.4	355.5	394.7	432.0	467.9	502.7	536.8	568.9	600.9	631.9	
45	40.82						330.3	373.4	414.6	453.8	491.5	528.2	564.0	597.8	631.4	664.0	
46	41.76						346.8	392.2	435.4	476.7	516.3	554.9	592.5	628.0	663.4	697.5	
47	42.70						364.3	411.9	457.5	500.8	542.5	583.0	622.6	659.9	697.1	733.0	
Basis: No. trees		1	7	16	28	50	59	68	38	18	4	1					290

*Logs are 16.3 feet long.

Block indicates extent of basic data.
Aggregate deviation = 0.24% low.
Average deviation = 5.71%.

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